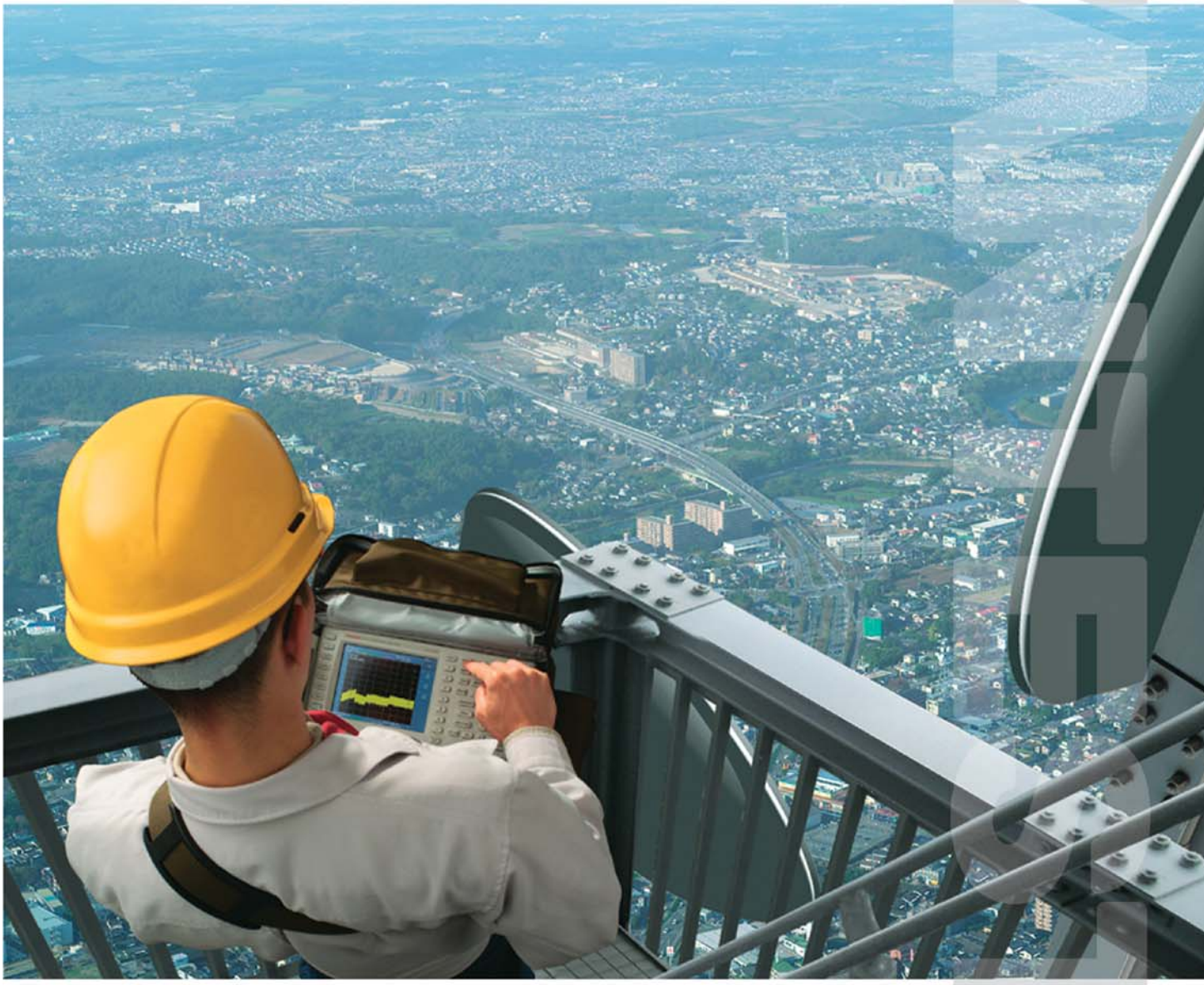
ADVANTEST

Spectrum Analyzers

U3771/3772

Handling frequencies of up to 43 GHz!! Our new microwave spectrum analyzer, ideal for field use, is now available.



A New Standard for Microwave and Millimeter-wave Spectrum Analyzers

The world's smallest and lightest microwave spectrum analyzer handles frequencies of up to 43 GHz.

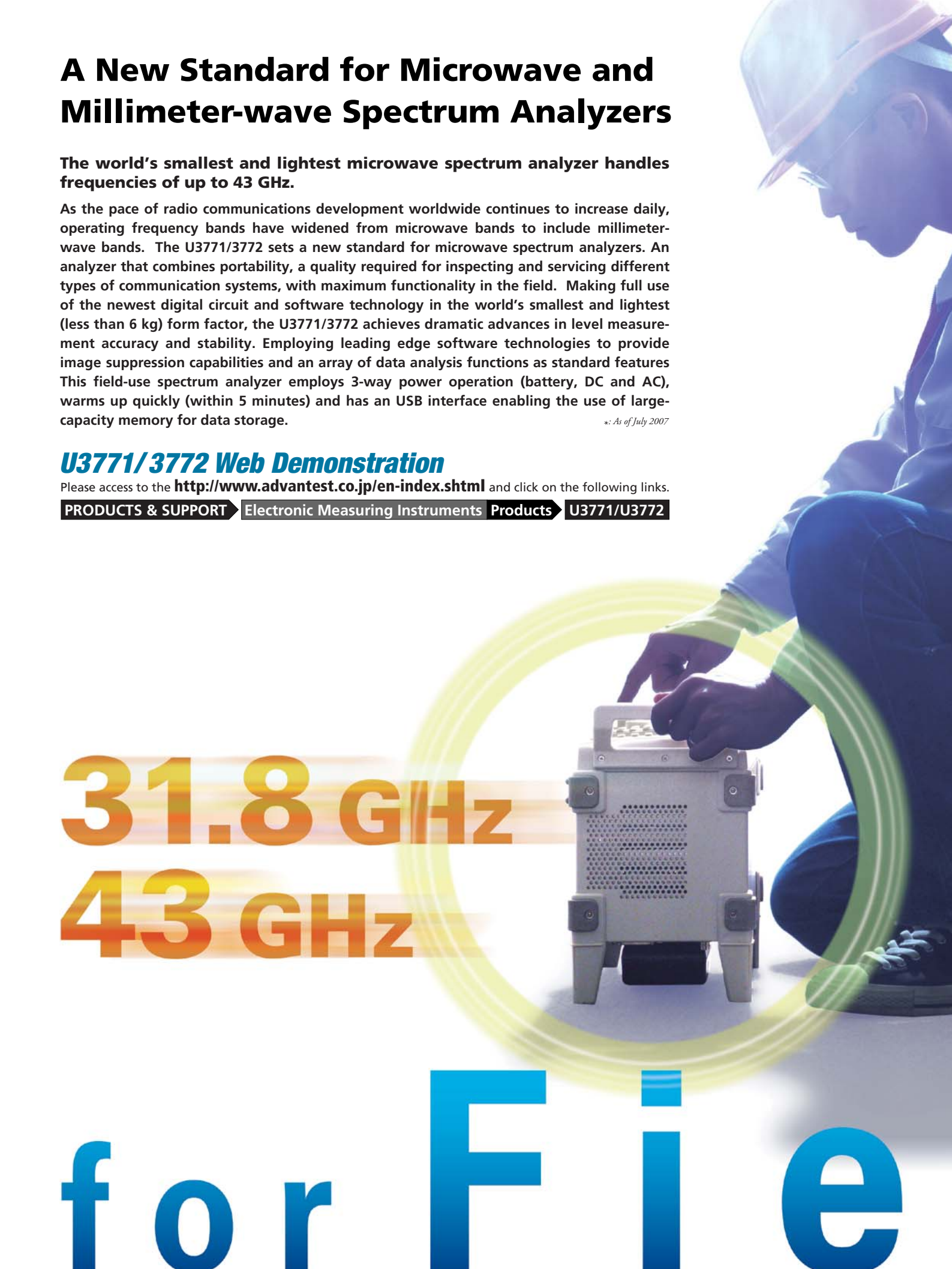
As the pace of radio communications development worldwide continues to increase daily, operating frequency bands have widened from microwave bands to include millimeter-wave bands. The U3771/3772 sets a new standard for microwave spectrum analyzers. An analyzer that combines portability, a quality required for inspecting and servicing different types of communication systems, with maximum functionality in the field. Making full use of the newest digital circuit and software technology in the world's smallest and lightest (less than 6 kg) form factor, the U3771/3772 achieves dramatic advances in level measurement accuracy and stability. Employing leading edge software technologies to provide image suppression capabilities and an array of data analysis functions as standard features This field-use spectrum analyzer employs 3-way power operation (battery, DC and AC), warms up quickly (within 5 minutes) and has an USB interface enabling the use of large-capacity memory for data storage.

**: As of July 2007*

U3771/3772 Web Demonstration

Please access to the **http://www.advantest.co.jp/en-index.shtml** and click on the following links.

PRODUCTS & SUPPORT > Electronic Measuring Instruments **Products** > **U3771/U3772**

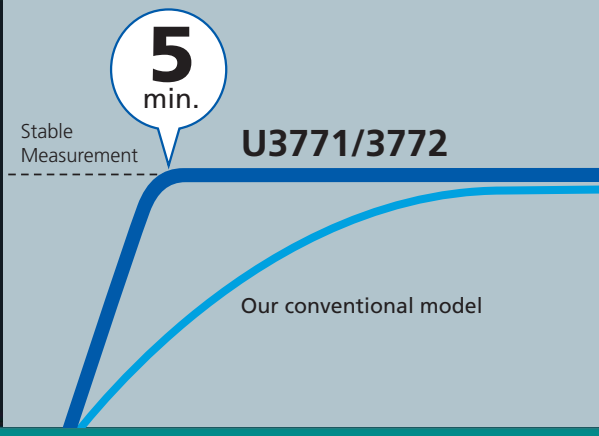


Compact Size

- Size and weight half that of existing spectrum analyzers with similar features
- Optimized for use in field maintenance tasks and surveys

5 min. Warm-up

- All but eliminates preheat time considerations
- Reaches operational specifications (level measurement accuracy) within just 5 minutes



USB Interface

- Support for USB for printer and memory

  Storage Image formats:
  PNG, BMP

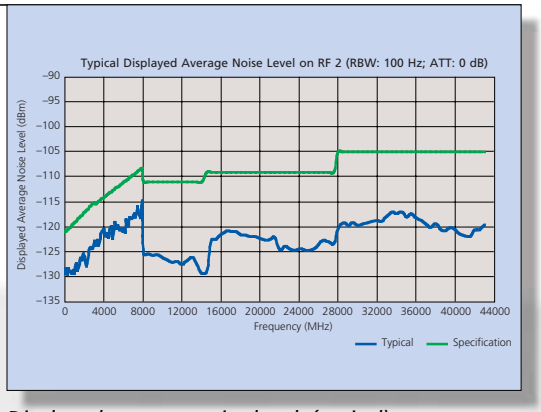
  Configuration file:
  BIN, XML

Operating with battery

- Includes a detachable battery pack
- Can operate continuously for up to 2 hours after a full-charge time of 5.5 hours

High-input Sensitivity

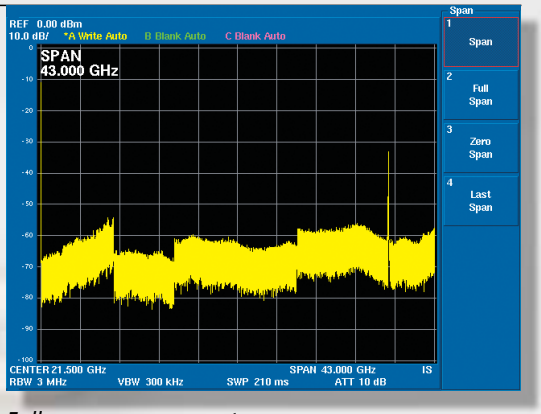
As measured frequencies become higher, noise level degradation places limits on measurement dynamic range. The latest RF technologies are incorporated in the U3771/3772 to reduce the noise floor level.
–117 dBm@34 GHz (typ.)



Displayed average noise level (typical)

Broadband Sweep

The U3771/3772 continuously sweeps across a frequency band of 10 MHz to 31.8 or 43 GHz allowing high-speed sampling of data on a single screen, simplifying broadband signal monitoring and harmonics measurement tasks.

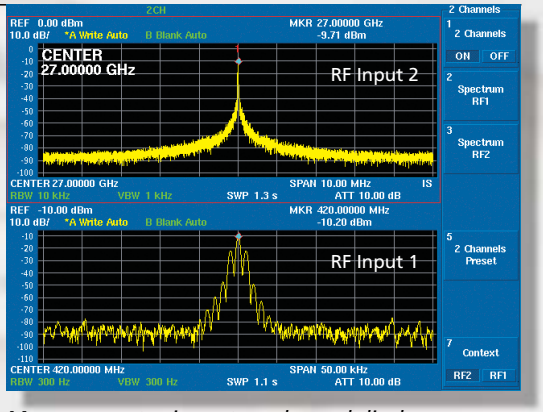


Full-span measurement

Two-Channel Display

The U3771/72 has two RF inputs: RF input 1 (9 KHz to 8 GHz) and RF input 2 (10 MHz to 31.8/43 GHz). By feeding different signals to the respective input ports, a spectrum display can be produced on the UPPER/LOWER screen. All of the settings for the UPPER/LOWER screen are independent of one another, allowing the product to function as a simple, two-channel spectrum analyzer.

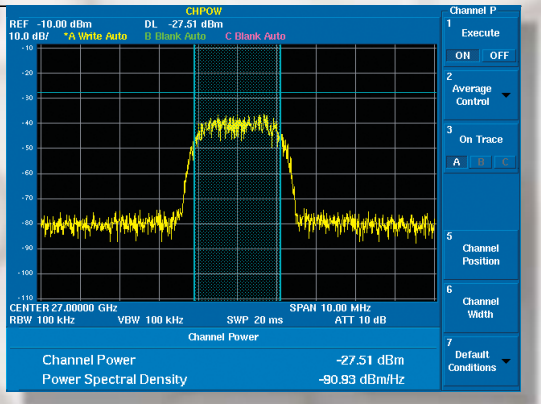
** The two-channel display function uses single-sweep operation.*



Measurement using a two-channel display

RMS Detector

The U3771/3772 include an RMS detector in addition to the traditional sample detector to increase its accuracy in broadband modulated signal power measurements. The RMS detector, the digital IF, and the software calibration function work together to provide higher-stability power measurement.



Channel power measurement

Image Suppression Function Useful for removing Images

Software pre-selector technology has been incorporated into the U3771/3772 to make a compact, lightweight, and inexpensive spectrum analyzer. The Image Suppression (IS) function allows you to identify and delete images easily. The U3771/3772 comes with the IS function enabled by default for operation as easy as that of a conventional model.

Note: The IS function is intended to determine whether the signal under test is a true or image signal. Set the IS function to OFF for detailed signal or modulated signal analysis, or for high-speed measurement.

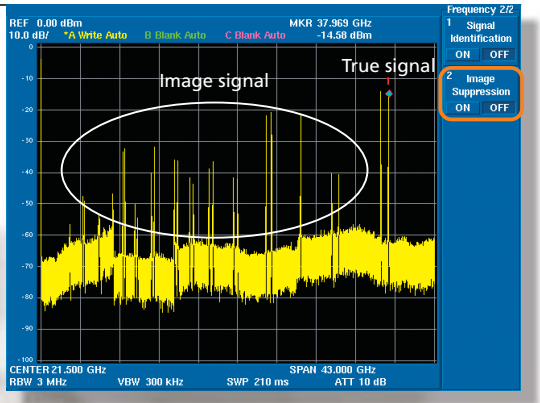


Image Suppression OFF

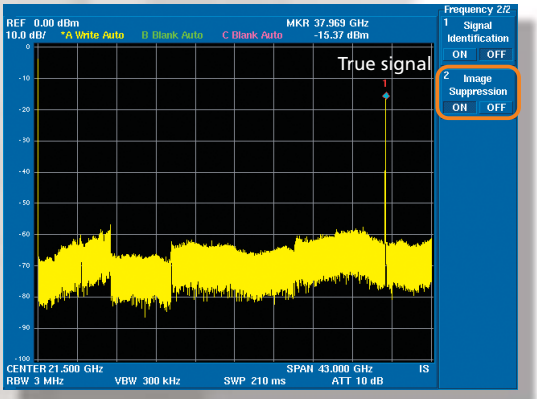
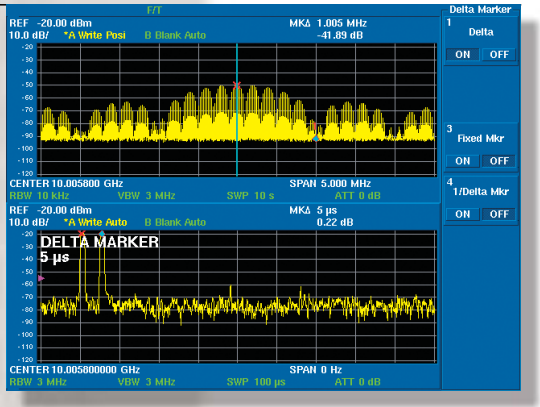


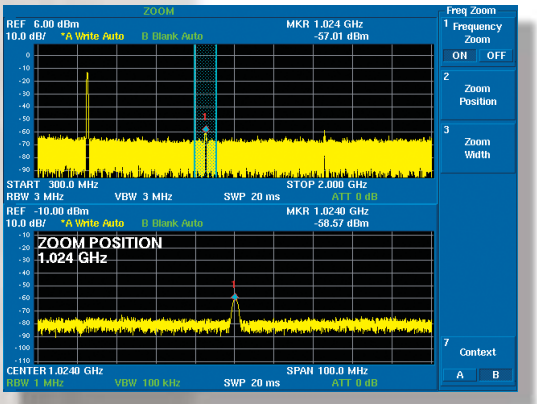
Image Suppression ON

Zoom Function

An example of a pulsed RF signal measured with the Frequency-Time (F-T) mode analysis feature of the zoom function is shown below. The U3771/3772 displays the pulse envelope (frequency domain) of double pulses (5-µs delay) having a pulse width of 1 µs and a pulse waveform (time domain) on separate screens. Additional features provided by the U3771/3772 support a wide variety of analysis tasks including Frequency-Zoom mode, in which different frequency spectra are displayed, and T-T display mode, which is useful for displaying expanded views of the time domain.



F-T mode analysis

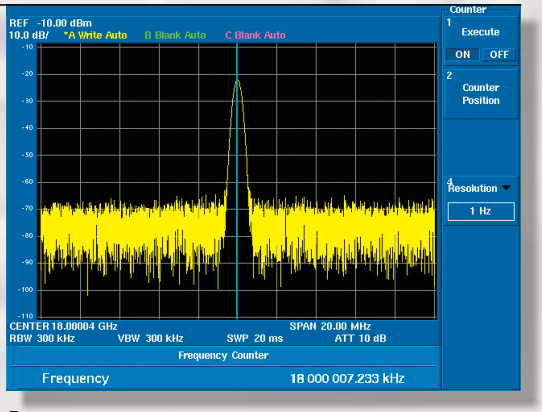


Freq. Zoom mode analysis

Millimeter wave frequency measurement

By pointing the marker at the signal to be measured, the U3771/72 can be used as a frequency counter of up to 31.8/43 GHz. Measurement resolutions of from 1 Hz to 1 kHz can be selected.

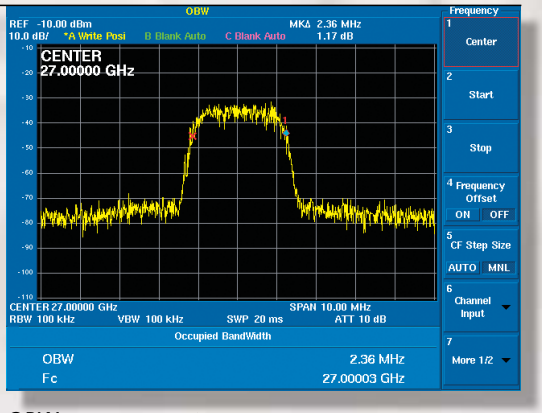
Using the marker counter function, which makes use of span accuracy, makes possible high-speed signal frequency confirmation when checking millimeter-wave modulation frequencies. (Resolution is determined by span setting.)



Frequency counter measurement

OBW Measurement Function

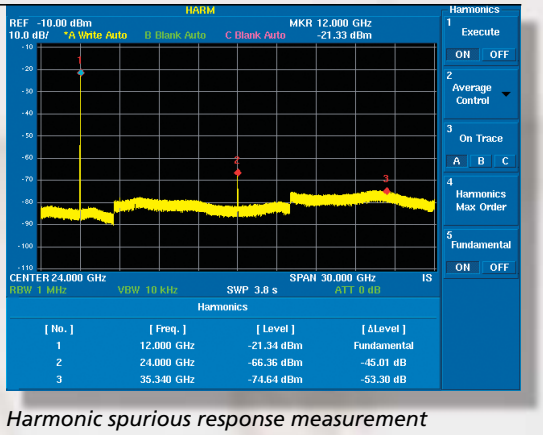
The U3771/3772 computes the bandwidth of a specified power ratio from measured spectrum data and displays the occupied bandwidth (OBW) and the center frequency (Fc). The OBW of 10 to 99.8% of total power can be chosen.



OBW measurement

Harmonics Measurement Function

The harmonics measurement function is optimal for measuring spurious response for wireless applications. To measure harmonic spurious response, simply entering or place a marker on the fundamental frequency. Up to 10 orders of harmonics can be measured and displayed.



Harmonic spurious response measurement

Other Measurement Functions

- Channel power
- Total power
- Average power
- Spurious measurement
- Frequency counter
- Adjacent channel leakage power measurement
- Spectrum emission mask
- Noise-Hz conversion
- XdB down
- Intermodulation
- Dual-screen display

Diverse Detector Types

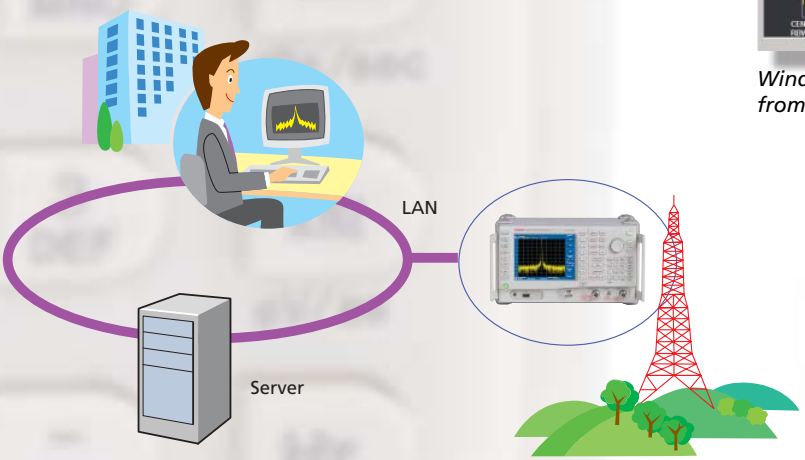
- Normal
- Positive peak
- Negative peak
- Sample
- RMS

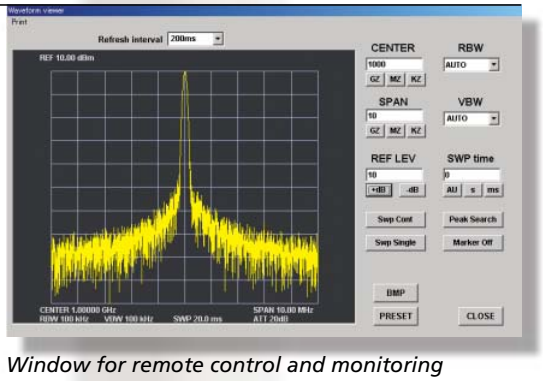
Marker Function

- Multimarker (10 markers)
- Delta marker
- Peak search

Optimal for Monitoring, Remote Control via a LAN

A 10/100BASE-T LAN port is provided as standard equipment, enabling remote control from a personal computer. The U3771/3772 can be installed at a remote-controlled station, such as an unattended, wireless transmission station, and signal output can be measured and observed through remote control and monitoring from a distant location.

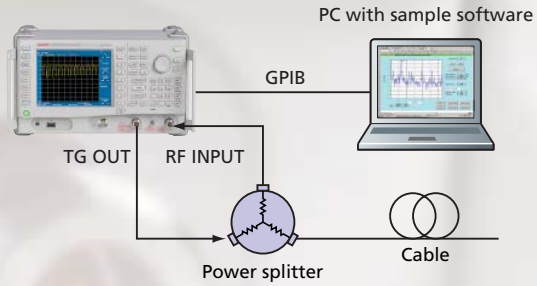


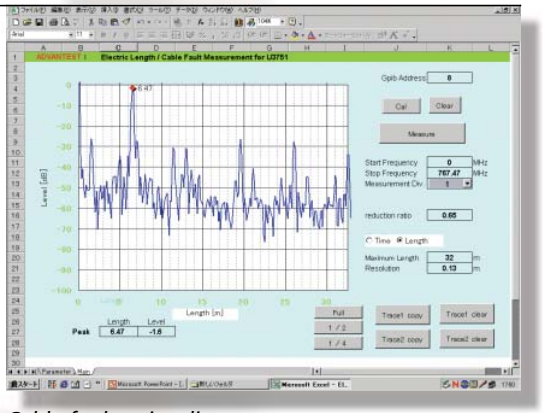


Window for remote control and monitoring from a personal computer via a LAN

Searching for the location of a fault in a coaxial cable

When used with its tracking generator option and the sample software for an external PC, the U3771/3772 can measure the distance to the failure point (open/short) in a coaxial cable. This application permits this distance to be measured from one end of the coaxial cable.

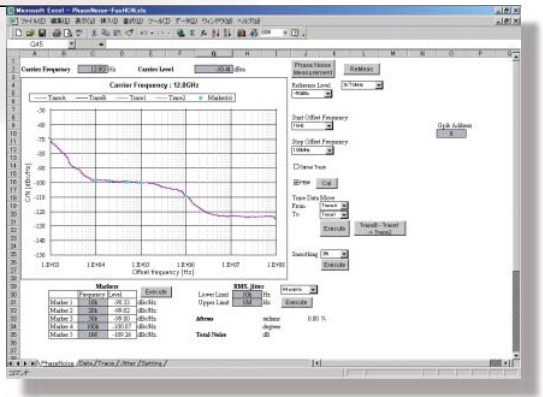




Cable fault point distance measurement

Evaluation of microwave oscillation circuits and microwave module characteristics

Using sample software on an external PC, the U3771/72 is an effective tool for evaluating phase noise characteristics of microwave oscillation circuits and microwave modules. Offset frequency from a carrier can be optionally set, making it easy to create a graph. Additionally, RMS jitter can be obtained from the power spectrum, simply by setting the frequency band.



Phase noise measurement using sample software

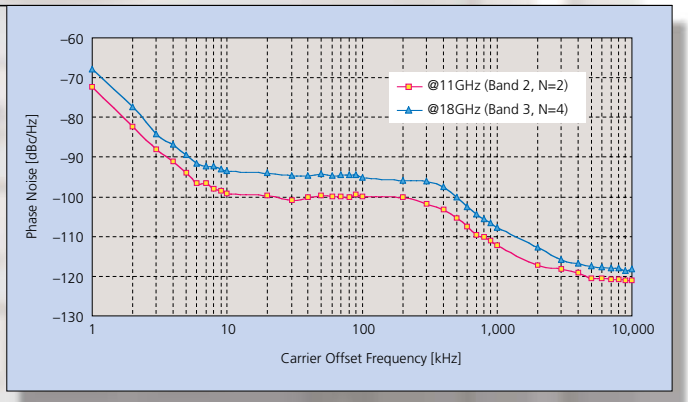
Option Guide

			Main unit support 1 ch	Main unit support 2 ch
2 Channel input (50 Ω)	OPT.10	Addition of RF INPUT2 (9 kHz to 3 GHz) Individual RF measurement with RF INPUT 1 and RF INPUT 2	—	● 1)
High-Stability Frequency Reference Source	OPT.20	Reference oscillator with an aging rate of ±2 x 10^{-8}/day, ±1 x 10^{-7}/year	●	●
EMC Filter	OPT.28	Addition of CISPR bandwidth for EMI measurement RBW (6 dB Down): 200 Hz, 9 kHz, 120 kHz, 1 MHz	●	●
Time-Domain Analysis (1 ch)	OPT.53	Analyze the basic parameter of RF signal on a time domain (amplitude/phase/frequency/FFT/IQ/IQ output)	● 2)	—
Time-Domain Analysis (2 ch)	OPT.54	Analyze the basic parameter of RF signal on a time domain (amplitude/phase/frequency/FFT/IQ/IQ output)	—	● 2)
High-Purity Spectrum Analysis	OPT.70	Spectrum analysis with -102 dBc/Hz @ 10 kHz offset (Typical) Addition of RBW 30 Hz	● 2)	—
Tracking Generator (3 GHz)	OPT.76	Frequency range: 100 kHz to 3 GHz Output level range: 0 to -60 dBm	● 3)	—
Tracking Generator (6 GHz)	OPT.77	Frequency range: 100 kHz to 6 GHz Output level range: 0 to -30 dBm	● 3)	—

1): When OPT.10 is installed, the standard equipment, 9 kHz to 8 GHz, is deleted, RF1 is 10 MHz to 31.8 GHz (U3771)/10 MHz to 43 GHz (U3772), and RF2 is 9 kHz to 3 GHz.
2): OPT.70 cannot be installed simultaneously with OPT.53/54.
3): One must be selected from OPT.76/77.

High-Purity Spectrum Analysis OPT.70

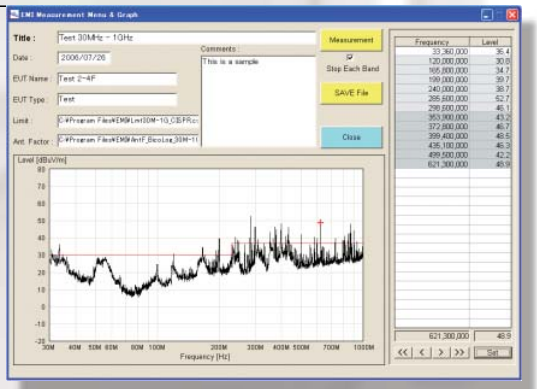
Phase noise measurement is indispensable to evaluation of the characteristics of high-frequency oscillation circuits or modules. The high-purity spectrum analysis option offered with the U3771/3772 can improve the phase noise measurement performance of the spectrum analyzer. Because the performance can be selected, selecting the most suitable spectrum analyzer for the device under test (DUT) is simple. At the same time, the added resolution bandwidth of 30 Hz enables reduction of the display average noise level and analysis in a high dynamic range.



Phase noise characteristic graph (representative values)

EMC Filter OPT.28

Option 28 adds 6 dB RBW CISPR bandwidths for EMI measurement of 200 Hz, 9 kHz, 120 kHz, and 1 MHz. A broadband sweep by the spectrum analyzer is very effective at measuring noise emitted from electrical devices. Installing OPT.28 allows measurement in CISPR-specified bandwidths. It enables simple, fast measurement using the Positive peak detector and Max Hold, which makes it effective at compensating for emitted noise. It guarantees an impulse bandwidth accuracy of 1 MHz. This capability conforms to the standard for noise measurement of 1 GHz or above.



Example of measurement using EMI sample software

Specifications

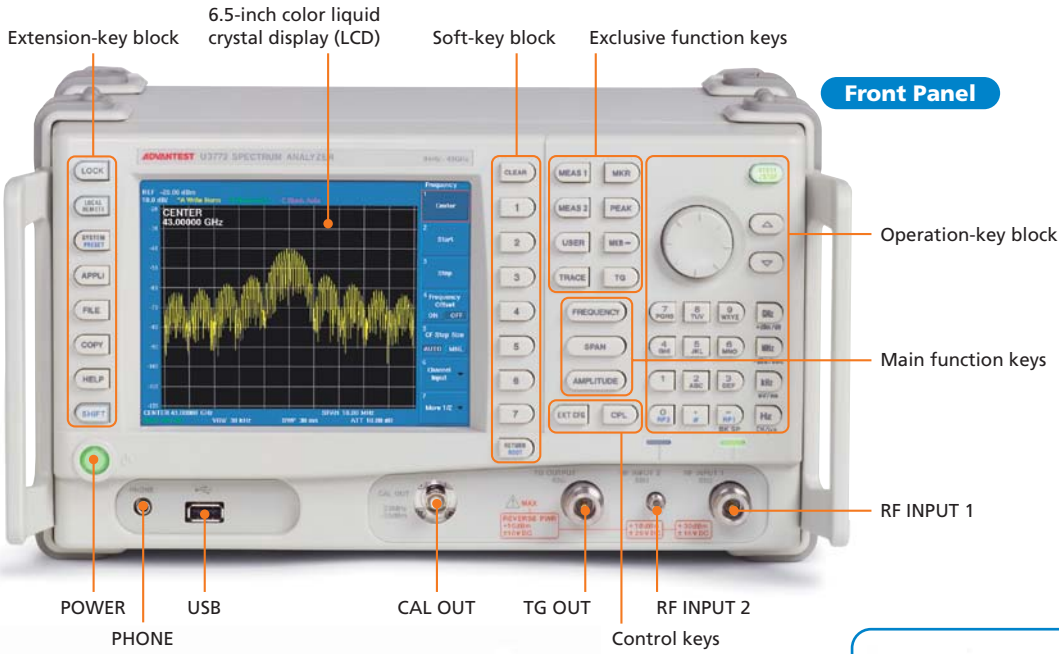
Frequency

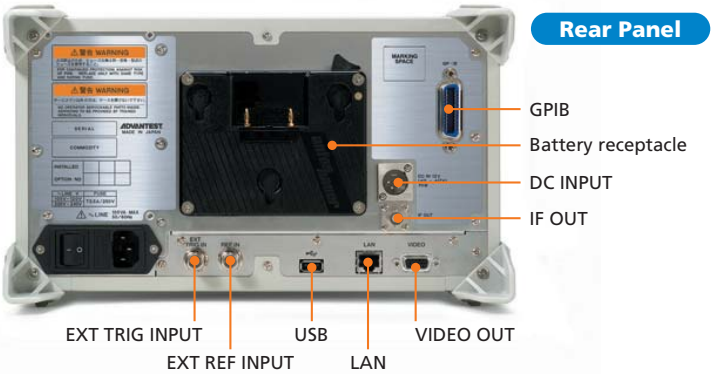
Frequency range	
RF input 1:	9 kHz to 8 GHz
Frequency band:	9 kHz to 3.1 GHz (band 0) 3.0 GHz to 8.0 GHz (band 1)
Preamp:	10 MHz to 8 GHz
RF input 2:	10 MHz to 31.8 GHz (U3771) 10 MHz to 43 GHz (U3772)
Frequency band:	10 MHz to 3.1 GHz (band 0, N=1) 3.0 to 8.0 GHz (band 1, N=1) 7.8 to 14.573 GHz (band 2, N=2) 14.4288 to 28.0 GHz (band 3, N=4) 27.8 to 31.8 GHz (band 4, N=6, U3771) 27.8 to 43.0 GHz (band 4, N=6, U3772)
Frequency reading accuracy:	± (marker read value x frequency reference accuracy + span x span accuracy + residual FM)
Frequency reference stability	
Aging rate:	±2 x 10^{-6}/year
Temperature stability:	±2.5 x 10^{-6} (0 to 50°C)
Frequency counter:	Resolution bandwidth ≤100 kHz, span ≤100 MHz, signal level: S/N >50 dB
Resolution:	1 Hz to 1 kHz
Accuracy:	± (counter read value x frequency reference accuracy + residual FM + 1 LSB)

Frequency stability	
Residual FM (zero/span):	< 60 Hz x Np-p/100 ms (internal frequency reference)
Frequency span	
Range:	5 kHz to Full, zero span 1 kHz to Full, zero span (with the OPT.70 installed)
Accuracy:	< ±1%
Spectrum purity:	(-85 + 20 LogN) dBc/Hz, offset 10 kHz, span<200 kHz
Resolution bandwidth	
Range:	100 Hz to 3 MHz (1 to 3 steps) 30 Hz to 3 MHz (with OPT.70 installed)
Accuracy:	< ±12%
Video bandwidth range:	10 Hz to 3 MHz (1 to 3 steps)

Sweep

Sweep time	
Setting range:	20 ms to 1000 s (spectrum mode) 50 µs to 1000 s (zero span)
Accuracy:	< ±2% (zero span)
Sweep mode:	Continuous, single, gated
Trigger function	
Trigger source:	Free run, video, external, IF





Amplitude range

Measurement range:	
RF input 1:	Displayed average noise level to +30 dBm
RF input 2:	Displayed average noise level to +10 dBm
Maximum safe input level:	Attenuator ≥ 10 dB
RF input 1:	±15 VDC max.
Preamp off:	+30 dBm (Attenuator ≥ 10 dB)
Preamp on:	+13 dBm (Attenuator 0 dB)
RF input 2:	+10 dBm (Attenuator 0 dB), ±25 VDC max.
Input attenuator range:	
RF input 1:	0 to 50 dB (10 dB steps)
RF input 2:	0 to 30 dB (10 dB steps)
Display range:	100/50/20/10/5 dB, linear
Scale unit:	dBm, dBmV, dBµV, dBµVemf, dBpW, W, V
Reference level setting range:	
RF input 1:	–140 to +40 dBm
RF input 2:	–140 to +20 dBm
Detection mode:	Normal, Positive peak, Negative peak, Sample, RMS, and Average

Amplitude accuracy

Calibration signal	
Frequency:	20 MHz
Level:	–20 dBm
Accuracy:	±0.3 dB
Scale fidelity	
Log:	±0.5 dB/10 dB ±0.5 dB/80 dB ±0.2 dB/1 dB
Level measurement accuracy:	After automatic calibration, image suppression off, Preamp off, at temperature 20 to 30°C, input attenuator 10 dB, reference level 0 dBm, input signal level –10 to –50 dBm
RF input 1	
Band 0:	±0.8 dB (frequency: 10 MHz to 3.1 GHz)
Band 1:	±1 dB (frequency: 3.1 to 8 GHz) ±1.5 dB (frequency: 9 kHz to 10 MHz)
RF input 2	
Band 0:	±0.8 dB (frequency: 10 MHz to 3.1 GHz)
Band 1:	±1 dB (frequency: 3.1 to 8 GHz)
Band 2:	±3.0 dB (frequency: 7.8 to 14.573 GHz)
Band 3:	±3.5 dB (frequency: 14.4288 to 28.0 GHz)
Band 4:	±4.5 dB (frequency: 27.8 to 31.8 GHz, U3771) ±4.5 dB (frequency: 27.8 to 43 GHz, U3772)

Dynamic range

Displayed average noise level:	Frequency >10 MHz, reference level <–45 dBm, at resolution bandwidth 100 Hz
RF input 1	
Band 0, Preamp off:	–123 dBm + 2f (GHz) dB
Band 1, Preamp off:	–122 dBm + 1.2f (GHz) dB
Band 0, Preamp on:	–138 dBm + 3f (GHz) dB
Band 1, Preamp on:	–139 dBm + 1.4f (GHz) dB
RF input 2	
Band 0:	–121 dBm + 2f (GHz) dB
Band 1:	–120 dBm + 1.5f (GHz) dB
Band 2:	–111 dBm (typical: –118 dBm)
Band 3:	–109 dBm (typical: –117 dBm)
Band 4:	–105 dBm (typical: –112 dBm)
1 dB gain compression:	Frequency: >10 MHz
Preamp off:	>–8 dBm
Preamp on:	>–25 dBm
Second harmonic distortion:	Preamp off
RF input 1:	<–70 dBc (mixer input level: –40 dBm; frequency: >200 MHz) <–75 dBc (typical) (mixer input level: –30 dBm; frequency: >300 MHz)
RF input 2:	<–40 dBc (mixer input level: –30 dBm) (U3771: 300 MHz to 31.8 GHz) (U3772: 300 MHz to 40 GHz)
Third order intermodulation distortion:	–50 dBc (frequency >10 MHz, Preamp off, mixer input level –20 dBm, 2-signal separation 1 MHz)
Image/Multiple/Out-of-band response	<–60 dBc (mixer input level –30 dBm, image suppression on, span <5 GHz)
Residual response:	–80 dBm (frequency >10 MHz, Preamp off)

Inputs/outputs

RF input	
RF input 1	
Connector:	N type female
Impedance:	50 Ω (nominal)
VSWR:	Input attenuator ≥ 10 dB <1.7 : 1 (10 MHz ≤ Frequency ≤ 3.0 GHz, Band 0) <2.0 : 1 (Frequency > 3.0 GHz, Band 1)
RF input 2	
Connector:	K type female
Impedance:	50 Ω (nominal)
VSWR:	Input attenuator ≥ 10 dB 1.7 : 1 (typical, Band 0) 2.0 : 1 (typical, Band 1, Band 2, Band 3) 2.5 : 1 (typical, Band 4)
Calibration signal output	
Connector:	BNC female
Impedance:	50 Ω (nominal)
Frequency:	20 MHz
Level:	-20 dBm
Frequency reference input	
Connector:	BNC female
Impedance:	50 Ω (nominal)
Frequency (MHz):	1, 1.544, 2.048, 5, 10, 12.8, 13, 13.824, 14.4, 15.36, 15.4, 16.8, 19.2, 19.44, 19.6608, 19.68, 19.8, 20, 26
Level:	0 to +16 dBm
External trigger input	
Connector:	BNC female
Impedance:	10 kΩ (nominal), DC coupling
Level:	0 to +5 V
21.4-MHz IF output	
Connector:	BNC female
Impedance:	50 Ω (nominal)
Level:	Approx. mixer input level + 10 dB (at a frequency of 20 MHz)
Battery mount	
Connector:	AntonBauer QR mount
External DC power input	
Connector:	XLR-4
Voltage range:	+11 to +17 V
GPIB:	IEEE-488 bus connector
USB:	USB 1.1
Video output:	VGA (D-sub15 pin female)
LAN:	RJ45 type, 10/100 base-T
Audio output:	Small monophonic jack

General specifications

Operating environment range:	Ambient temperature: 0 to + 50°C Humidity: RH 85% or less (no condensation)
Storage environment range:	-20 to +60°C, RH 85% or less
AC power input:	Automatic switching to 100 VAC or 200 VAC 100 V: 100 to 120 V, 50/60 Hz 200 V: 220 to 240 V, 50/60 Hz
DC power input:	DC + 11 V to +17 V
Power consumption:	100 VA or less (AC operation) 70 W or less (DC operation)
Mass:	6 kg or less (excluding options)
External dimensions (W x H x D):	Approx. 308 x 175 x 209 mm (not including protruding parts) Approx. 337 x 190 x 307 mm (including the handle and feet)

OPT.20 High-Stability Frequency Reference Source

Frequency reference stability	
Aging rate:	±2 x 10^{-8}/day ±1 x 10^{-7}/year
Warm-up drift:	±5 x 10^{-8} (+25°C, 10 minutes after power-on)
Temperature stability:	±5 x 10^{-8} (0 to +40°C, with reference to 25°C)

OPT.28 EMC Filter

6 dB bandwidth:	200 Hz, 9 kHz, 120 kHz, 1 MHz
Bandwidth accuracy:	< ±10%

OPT.70 High-Purity Spectrum Analysis

Frequency span	
Range:	1 kHz to Full, zero span
Accuracy:	< ±1%
Resolution bandwidth	
Range:	30 Hz to 3 MHz (1 to 3 steps)
Accuracy:	< ±12%
Spectrum purity:	≤ (-98 + 20 LogN) dBc/Hz (offset 10 kHz, span ≤ 1 MHz) (-102 + 20 LogN) dBc/Hz (typical)
Displayed average noise level:	Frequency >10MHz, Reference level <-45dBm, Resolution bandwidth 30 Hz
RF input 1	
Preamp OFF:	-126 dBm + 2f (GHz) dB (band 0) -125 dBm + 1.2f (GHz) dB (band1)
Preamp ON:	-141 dBm + 3f (GHz) dB (band 0) -142 dBm + 1.4f (GHz) dB (band 1)
RF input 2:	-124 dBm + 2f (GHz) dB (band 0) -123 dBm + 1.5f (GHz) dB (band 1) -114 dBm (band 2) -112 dBm (band 3) -108 dBm (band 4)

OPT.76 Tracking Generator

Frequency range:	100 kHz to 3 GHz
Frequency offset	
Range:	0 Hz to 1 GHz
Accuracy:	±300 Hz
Resolution:	1 kHz
Output level range:	0 to -60 dBm (0.5 dB steps)
Output level accuracy:	±0.5 dB (20 MHz, -10 dBm, +20 to +30°C)
Output level flatness:	Using 20 MHz and -10 dBm as a reference ±1.0 dB (1 MHz to 1 GHz) ±1.5 dB (100 kHz to 3 GHz)
Output level switch error:	Using -10 dBm as a reference ±1.0 dB (1 MHz to 1 GHz, 0 to -60 dBm) ±2.0 dB (1 MHz to 2.6 GHz, 0 to -60 dBm) ±3.0 dB (100 kHz to 3 GHz, 0 to -30 dBm) ±4.0 dB (100 kHz to 3 GHz, -30.5 to -60 dBm)
Frequency offset ON:	±5.0 dB (100 kHz to 3 GHz, 0 to -60 dBm)
Output spurious:	Output level -10 dBm
Harmonic:	≤ -15 dBc (100 kHz to 1 MHz) ≤ -20 dBc (1 MHz to 3 GHz)
Non-harmonic:	≤ -20 dBc (Frequency offset OFF)
TG leakage:	≤ -80 dBm (Input attenuator 0 dB)
Output impedance:	50 Ω (nominal)
VSWR:	≤2.0 : 1 (Output level ≤ -10 dBm)
Maximum allowable level:	+10 dBm, ±10 VDC

Ordering information

Main unit	
Spectrum analyzer:	U3771 U3772
Accessories	
Operating manual (CD):	BU3700S
Power cable:	A01412
Input cable:	A01037-0300
N-BNC adapter:	JUG-201A/U
K-K adapter:	HE-A-PJ
BNC-SMA adapter:	HRM-517
Ferrite core:	ESD-SR-120
Ferrite core:	E04SR150718
Options	
2 Channel input (50 Ω)*:	OPT.10
High-stability frequency reference source:	OPT.20
EMC filter:	OPT.28
Time-domain analysis (1 ch):	OPT.53
Time-domain analysis (2 ch):	OPT.54
High-purity spectrum analyzsis:	OPT.70
Tracking generator (3 GHz):	OPT.76
Tracking generator (6 GHz):	OPT.77
Accessories	
Filter for spurious measurement (2.8 to 18 GHz HPF):	A899001
Filter for spurious measurement (8 to 18 GHz HPF):	A899002
Filter for spurious measurement (11 to 26 GHz HPF):	A899003
Filter for spurious measurement (18 to 30 GHz HPF):	A899004
Japanese operating manual (printed manual):	JU3700S
English operating manual (printed manual):	EU3700S
Battery pack:	A870008
Charger:	A870009
75 Ω input impedance converter:	ZT-130NC
DC power cable:	A114020
Carrying bag:	A129001
Transit case:	A129002
Rack mount kit (JIS):	A122003
Rack mount kit (EIA):	A124004

Note on accessories:
The operating manual on the CD is supplied as standard.
The printed version of the operating manual is offered as an accessory.

*: When OPT.10 is installed, the standard equipment, 9 kHz to 8 GHz, is deleted, RF1 is 10 MHz to 31.8 GHz (U3771)/10 MHz to 43 GHz (U3772), and RF2 is 9 kHz to 3 GHz.

Please refer to product manual for complete system specifications.
Specifications may change without notification.